

## 20. Thurber Fescue Ecological Series

Table 20-1. Full and short names for the ecological types in the Thurber Fescue Ecological Series.

Ecological Type		Plant Association	Short Name
Code	Name	Code	
GA04	Thurber fescue/Arizona fescue—Deep Argic Cryoborolls, not coarse on surface—Linear protected footslopes and toeslopes, 9,200-10,800 ft	FETH/FEAR2	Thurber-Arizona fescues—Deep cold dark soils
GA05	Thurber fescue/Idaho fescue—Deep Argic Cryoborolls, not coarse on surface—Linear to concave toeslopes and footslopes, 9,500-11,200 ft	FETH/FEID	Thurber-Idaho fescues—Deep cold dark soils
GA06	Thurber fescue/meadow-rue-vetch-elk sedge—Deep to very deep Argic Cryoborolls, sometimes Pachic, not coarse on surface—Linear to concave backslopes and footslopes, 8,700-11,300 ft	FETH/THFE-VIAM-CAGE2	Thurber fescue/moist forbs—Deep dark clay soils—Linear or concave slopes

This is the *Festuca thurberi* series of Moir (1978), Hess (1981), Hess and Wasser (1982), and Komárková (1986, in part). Moir (1983) considered it a non-climatic series, although I believe that it is a climatic series. It encompasses part of the Fescue series of Donart and others (1978) and of Dick-Peddie (1993), and part of the *Danthonia parryi* series of Hess (1981). Stands of this series occupy medium- to large-sized sites that are often isodiametric in shape and are easily distinguished on aerial photographs by their unique texture, though early seral Thurber fescue grasslands can sometimes be difficult to distinguish from early seral willow riparian areas.

### Vegetation, Soils, Climate

Vegetation and litter hold a great deal of moisture, and soils have relatively high organic content. Evaporation is rarely significant, and evapotranspiration never exceeds input from the soil or precipitation.

Many of these sites may be considered “subriparian,” in that they are moist throughout the growing season and wet during some seasons. Redoximorphic mottles are often visible in the soil.

Thurber fescue is an obligate outcrosser. Plants must be close enough together for pollen to transfer from one plant to another for successful pollination. When Thurber fescue plants are 3-4 m or more apart on average, pollen cannot reach other plants, and the stand becomes non-reproductive. When extant Thurber fescue plants senesce and die, Thurber fescue is lost from the site, increasing erosion potential and creating a permanent disclimax.

Turner (1972) presents regression equations for predicting moisture content of various plants’ foliage, based on the moisture content of two predictor species, Idaho fescue (*Festuca idahoensis*), and Oregon fleabane (*Erigeron speciosus*).

Winter solifluction and mass slumps on steep, snow-burdened slopes are common on these sites (Moir 1967).

Table 20-2. Climate and Soils

Characteristic	Value	Reference
Precipitation zone	737 mm/yr (610-810 mm/yr) 29 in/yr (24-32 in/yr) mostly as snow	Ellison and Aldous (1952), Klemmedson (1956), Brown and Thompson (1965), Weaver (1979)
Mean annual air temperature	4°C (-10°C to 14°C) 39°F (14°F to 57°F)	Weaver (1979)
Growing season precipitation	171 mm (81-280 mm) 6.8 in (3-11 in)	Ellison and Aldous (1952), Klemmedson (1956), Brown and Thompson (1965), Weaver (1979)
Growing period	average 130 days	Brown and Thompson (1965)
Total soil moisture (0-8 ft)	spring: 876 mm (800-950 mm) 34.5 in (31-38 in) fall: 777 mm (650-810 mm) 30.6 in (25-32 in)	
Water use during the growing season	2.01 mm/da (1.9-2.4 mm/da) 0.079 in/da (0.075-0.100 in/da)	

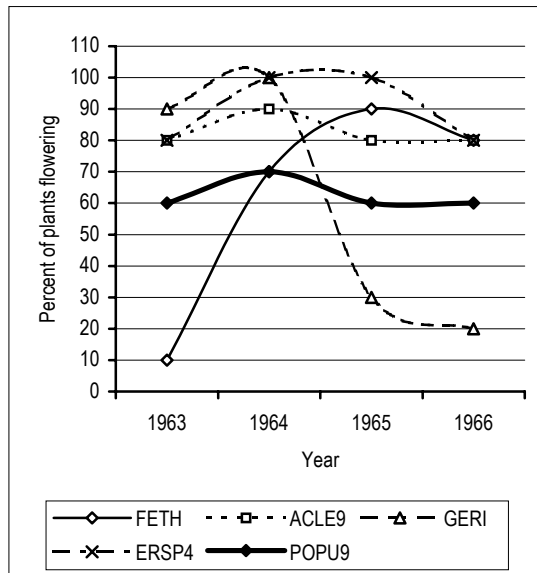


Fig. 20-1. The natural flowering of five species for four years, 1963-1966. "The cool, moist summers of 1964 and 1965 favored flowering and seed maturation of all five species" (Paulsen 1970).

Species are Thurber fescue (*Festuca thurberi*), Letterman needlegrass (*Achnatherum lettermanii*), Richardson geranium (*Geranium richardsonii*), Oregon fleabane (*Erigeron speciosus*), and beauty cinquefoil (*Potentilla pulcherrima*).

Spraying with 2,4-D increases graminoid production 19 years after treatment, decreasing production of forbs and shrubs. These trends are more pronounced if cattle grazing is excluded (Turner 1969). Insects and diseases are not documented for this series.

#### Range and Wildlife Management

Grazing by cattle tends to reduce the cover and production of fescues (Arizona and Idaho first), Parry oatgrass, and wheatgrass; they are replaced by Kentucky bluegrass and invaders (Moir 1967, Dick-Peddie 1993). Paulsen (1975) recommends about 2.5 ac/AUM as an overall stocking rate in this grassland type. If a site is in good condition, livestock could be grazed at the rate of 1.5 ac/AUM.

Older Thurber fescue plants are somewhat palatable to grazing animals (livestock or big game), but definitely are not preferred if other grasses are available. Succulent forbs or young Thurber fescue plants are much more palatable. Under heavy grazing conditions, cattle typically remove all of the palatable grasses (Arizona fescue, Idaho fescue, Parry oatgrass, Kentucky bluegrass), palatable forbs, and young Thurber fescue before they eat the older Thurber fescue. This leaves big, old Thurber fescue plants with nothing between them but Kentucky bluegrass, unpalatable forbs, and bare ground, and all the young climax grasses are consumed every year. Under those conditions, Thurber fescue will be eliminated from a site when old plants die, and if their demise is hastened by

grazing – erosion, soil loss and reduction of site value follows quickly (see Paulsen 1975).

Palatable species to cattle include Idaho fescue (FEID), Thurber fescue (FETH), Rocky Mountain fescue (FESA), nodding brome (BRPO5), sedges (CAREX), fleabane (ERSP4), aspen peavine (LAL2), and false-dandelion (AGGL) (Klemmedson 1956, Paulsen 1969). Species that decrease with livestock grazing include Arizona fescue (FEAR2), Idaho fescue, osha (LIPO), Oregon fleabane, and nodding brome (Moir 1967, Turner 1969). Species that increase with livestock grazing include dandelion (TAOF), yarrow (ACLA5), orange sneezeweed (DUHO), and sageworts (ARFR4 and OLIGO) (Moir 1967, Turner 1969). Silver sagebrush (ARCA13) invades these sites when they are overgrazed (Turner 1969).

Total live vegetation production ranges from 1,000 lb/ac/yr in poor condition to 2,800 lb/ac/yr in excellent condition (Paulsen 1975). Grass production ranges from 400 lb/ac/yr under poor conditions to 2,100 lb/ac/yr under excellent conditions (Aldon and Barstad 1987, Turner 1951).

Klemmedson (1956) studied the composition of basal cover of Thurber fescue grasslands to determine condition classes and classified erosion status based on the soil pedestals that hold individual plants (grasses or forbs). Summary of his classification is shown in Figure 20-2 and Table 20-3.

Pocket gophers (*Thomomys talpoides*) can be a significant problem in disturbed sites or microsites (Julander and others 1969). Pocket gophers become more active with increased disturbance, such as the baring of soil by livestock grazing (Ellison and Aldous 1952). Much of the pocket gopher's food comes from the underground parts of plants, mostly forbs such as fleabane, geranium, and hairy golden aster (Ward and Keith 1962). Removing pocket gophers from an overgrazed area changes vegetation production little, although dandelion decreases where gophers are present, and grasses, sedges, and rhizomatous species increase where gophers are present. Pocket gophers may provide a benefit to overgrazed sites by loosening the soil and increasing infiltration (Ellison and Aldous 1952). Pocket gophers can also use the understory of aspen stands, which have a similar soil to these Thurber fescue sites, and may occur adjacent to them (McDonough 1974). Where pocket gophers were controlled by trapping, total aboveground production and forage were both increased (Figure 20-3; Turner 1969).

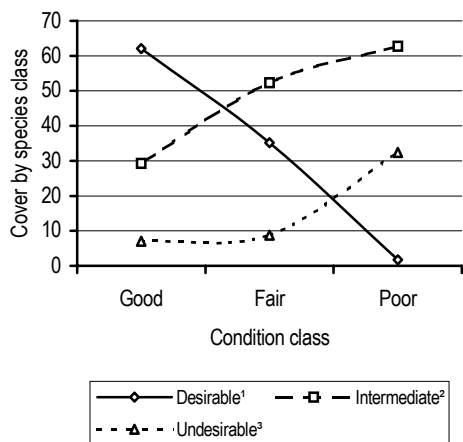


Fig. 20-2. Range condition classes in Thurber fescue types (Klemmedson 1956).

1. *Desirable Species* include Thurber fescue, Idaho fescue, Arizona fescue, Rocky Mtn. fescue, and nodding brome.
2. *Intermediate Species* include slender wheatgrass, Kentucky bluegrass, Letterman needlegrass, columbine, mountain parsely, peavine, yarrow, Oregon fleabane, larkspur, and meadow-rue.
3. *Undesirable Species* include violet, aster, lupine, orange sneezeweed, cinquefoil, buckwheat, thistle, yellow golden-eye, strawberry, and scarlet gilia (Klemmedson 1956). All the Desirable species, I would class as *Late Seral*. Most of the Intermediate species are *Midseral*, except slender wheatgrass (*Late Seral*), Kentucky bluegrass (*Early Seral*), peavine (*Late Seral*), Oregon fleabane (*Late Seral*), and meadow-rue (*Late Seral*). Most of the Undesirable species are *Early Seral*, except buckwheat (*Late Seral*), considered here to be an Intermediate species.

### Recreation, Roads & Trails, Scenery

Sites are moderately suitable for roads and trails, but construction is limited by deep, loamy, sometimes clayey soils that often occur on slumps, in a high-precipitation zone. Roads and trails should be closed during mud seasons, when the potential for mass movement is often high. Roads and trails should be graveled and ripped; roads will need culverts and ditches, and rerouting travel might be the best solution. Sites are not suitable for developed recreation because of the slumpy soils and potential for mass movement. They are moderately suitable for dispersed recreation if the soil is not disturbed. In sites with dense Thurber fescue, camping on the ground is difficult because of the dense vegetation.

Table 20-3. Relationship of site variables to range condition classes in Thurber fescue grasslands (Klemmedson 1956).

Factor	Site Condition Class		
	Good	Fair	Poor
Bare soil cover	6.4%	15.0%	35.2%
Rock cover¹	2.8%	13.1%	20.8%
Litter cover	40.3%	26.2%	16.1%
Plant density index	48.3%	42.1%	24.1%
Organic matter²	9.9%	7.2%	6.1%
Bulk density²	0.970	1.156	1.198
Infiltration, m/i³	7.82	8.71	30.08
Pedestal Stage⁴ I	94.7%	60.0%	21.7%
Pedestal Stage⁴ II	4.4%	30.5%	53.6%
Pedestal Stage⁴ III	1.0%	8.9%	22.3%
Pedestal Stage⁴ IV	0.0%	0.7%	2.3%

1. "Erosion Pavement:" accumulations of rock material < 0.75 in diam.
2. Soil sampled for organic matter and bulk density, surface 2 in.
3. Infiltration in minutes per inch of water.
4. Percent of plants in a site in a pedestal stage.

#### Pedestal Stages

Stage I. Plant crown on a level or near level with surrounding surface of soil.

Stage II. Plant crown above level of soil surface around part of its perimeter; breaking away tends to occur on the downhill side of the clumps.

Stage III. Plants on a soil pedestal above the adjacent surface on all sides.

Stage IV. Grass on top of the pedestal dead or nearly so; pedestal disintegrating.

### Revegetation and Rehabilitation

Revegetation is usually easy, with many species and practices to choose from in these sites because of the highly productive soils and abundant moisture. However, seeds are usually not available for many of the dominant natives, notably the fescues (Thurber, Arizona, Idaho) and Parry oatgrass. The tendency for many of these soils to slump and the potential for mass movement are limits to revegetation.

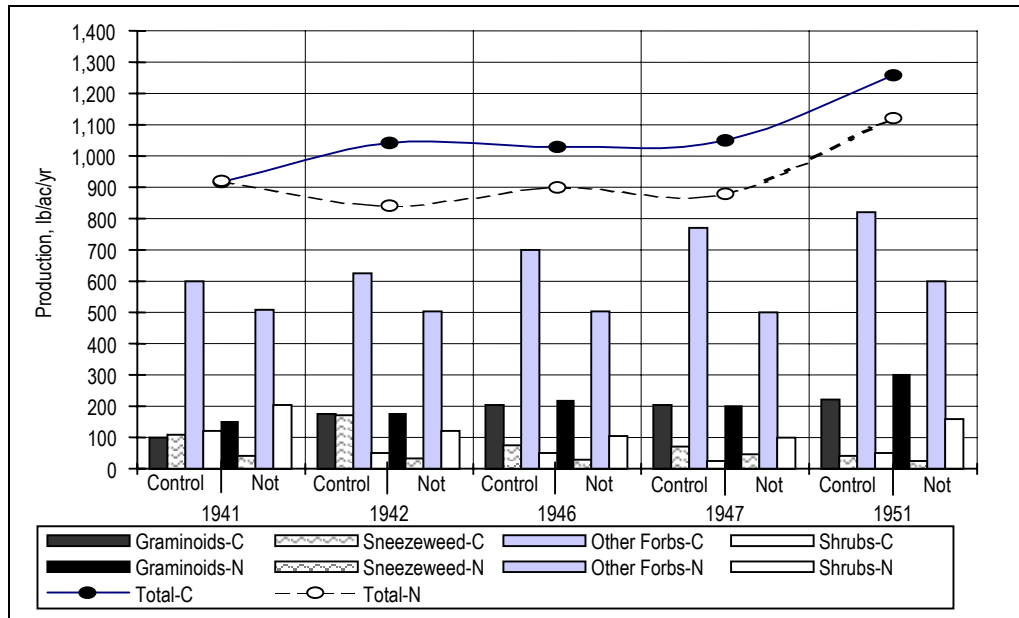


Figure 20-3. Aboveground production as it changes when pocket gophers are controlled (Turner 1969)



A typical Thurber fescue-Arizona fescue site (Community Type D) in late season. Thurber fescue and other grasses nearly cover the ground. Arizona fescue 50% cover, Parry oatgrass 27%, blunt sedge 22%, Thurber fescue 14%, mountain muhly 9%, Rocky Mountain fescue 6%. Coarse Fragments Cover = 2%, Total Live Cover = 202%, Coarse Fragments in Soil = 45. Soil sampled as an Argic Cryoboroll, Loamy-Skeletal, Mixed. Elk Park Quadrangle, elevation 10,155 ft, 12% 128° (SE) slope. September 20, 1994.

## Key to Ecological Types in the Thurber Fescue Ecological Series

1. Thurber fescue >10% cover, Idaho fescue >2% cover, or slender wheatgrass >2% cover. Cryoborolls ..... (2)
1. Thurber fescue, Idaho fescue, and slender wheatgrass usually absent, rarely <1% each. Cryoborolls, Argiborolls, or Aridisols ..... GAO7 (in the Osha Series)
2. Idaho fescue always present, >4% cover. Thurber fescue usually absent, sometimes <2% cover. Soils barely Mollic (average 12 cm thick), shallow to Argillic horizon. Concave backslopes and footslopes ..... GAO8 (in the Idaho Fescue Series)
2. Thurber fescue usually present, 0-95% cover. Idaho fescue absent to abundant, 0-30% cover. Soils deep-Mollic (typically 20-50 cm thick), with or without an Argillic horizon ..... (3)
3. Dominated by the medium to tall forbs osha, false-hellebore, mule's ears, nodding helianthella, or larkspur. Idaho fescue absent. Thurber fescue usually absent, sometimes <5% cover. Slender wheatgrass absent or abundant, 0-85% cover. Very deep Argic Cryoborolls. Linear to concave slumps and earthflows, 9,100-10,200 ft ..... GAO7 (in the Osha Series)
3. Usually dominated by Thurber fescue, Idaho fescue, or other graminoids. Osha usually absent..... (4)
4. Arizona fescue present and >0.1% cover, often >5%. Idaho fescue usually absent; if Idaho fescue is present, then it is clearly subordinate to Arizona fescue. 9,200-10,900 ft.....(5)
4. Arizona fescue usually absent; if Arizona fescue is present, then it is clearly subordinate to Idaho fescue. Idaho fescue sometimes absent, sometimes present, 0-75% cover ..... (6)
5. Thurber fescue absent ..... GAO3 (in the Arizona Fescue Series)
5. Thurber fescue present, 0.5-50% cover..... GAO4
6. Idaho fescue present and >2% cover. Total forb cover 10-115%, usually <100% ..... GAO5
6. Idaho fescue absent. Total forb cover 100-160% ..... GAO6

Table 20-4. Characteristics of Ecological Types within Ecological Series 20 in the Upper Gunnison Basin.  
Numbers are shown in form Average (Minimum-Maximum)

Code Short Name	No. Samples	Elevation, ft	Avg. Aspect, °M (r) Slope, %	Soil Coarse, %	Depth, cm Mollic, cm	Surface: Coarse, % Bare, %	Cover, %: Trees Shrubs Graminoids Forbs	Total Live Cover, % No. Species TLC/NS, %
GA04 Thurber-Arizona fescues— Deep cold dark soils	12	10,072 (9,210-10,800)	133 (0.83) 17 (4-49)	50 (19-85)	69 (46-87) 37 (13-65)	4 (1-19) 10 (0-30)	0 (0-0) 3 (0-11) 121 (80-153) 35 (8-83)	158.7 (105.8-201.5) 25 (20-36) 6.5 (4.6-9.5)
GA05 Thurber-Idaho fescues— Deep cold dark soils	12	10,212 (9,500-11,120)	141 (0.59) 9 (2-31)	45 (30-55)	68 (41-116) 45 (18-116)	3 (0-9) 25 (8-60)	0 (0-2) 8 (0-72) 83 (14-147) 53 (10-112)	144.8 (89.5-217.6) 27 (18-34) 5.6 (3.5-11.7)
GA06 Thurber fescue/moist forbs—Deep dark clay soils—Linear or concave slopes	12	10,024 (8,700-11,240)	140 (0.25) 16 (4-30)	24 (1-53)	101 (52-190) 48 (18-94)	2 (0-9) 6 (1-60)	0 (0-2) 3 (0-16) 130 (103-154) 88 (18-181)	221.5 (129.0-334.3) 31 (20-39) 7.5 (4.0-11.9)

Thurber fescue/Arizona fescue-Deep Argic Cryoborolls, not coarse on surface-  
Linear protected footslopes and toeslopes, 9,200-10,800 ft

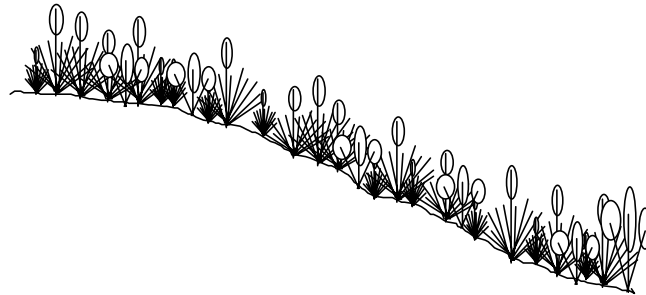


Figure 20-4. Cross-section of vegetation structure of *Thurber-Arizona fescues-Deep cold dark soils*. Aspects are southeasterly, and slope angles average 17%.

*Thurber-Arizona fescues-Deep cold dark soils* is a very common type on protected lower Subalpine slopes, in areas with deep soils, either inside or outside rainshadow climates. In the Gunnison Basin, this type occurs in parks and on benches in the Subalpine zone. It has also been described from southwestern Colorado and New Mexico. *Thurber-Arizona fescues-Deep cold dark soils* is characterized by Thurber fescue (FETH), Arizona fescue (FEAR2), and Parry oatgrass (DAPA2). See Table 20-7 for common species names and codes. Other distinguishing features include deep-loamy Cryic soils.

*Thurber-Arizona fescues-Deep cold dark soils* is related to *Arizona fescue/muhly-Deep-Windward slopes*, which occurs on steeper, more exposed slopes at lower elevations with coarser-surface soils, and lacks Thurber fescue. *Thurber-Arizona fescues-Deep cold dark soils* is also related to *Thurber-Idaho fescues-Deep cold dark soils*, which occurs at slightly higher elevations, and supports Idaho fescue (FEID) instead of Arizona fescue.

*Thurber-Arizona fescues-Deep cold dark soils* is also related to *Douglas-fir/Thurber fescue-Cold dark soils-Gentle*, an open-forest type dominated by Douglas-fir (PSME) which occurs at lower elevations on somewhat steeper, coarser slopes, on soils which have a thinner dark (Mollic) layer. *Thurber-Arizona fescues-Deep cold dark soils* is also related to *Aspen/Thurber fescue-Deep dark soils*, a forested type that occurs at somewhat lower elevations on less-coarse soils, often adjacent on the same slumps or earthflows.

The plant association *Festuca thurberi/Festuca arizonica* (Johnston 1987) is based on descriptions in Moir (1969) and Komarkova (1986). *Festuca thurberi/Festuca arizonica* phase *Danthonia parryi* is described as new here, and is based on *Festuca thurberi/Danthonia parryi* (Johnston 1987), which in turn is based on descriptions in Moir (1967), Radloff (1983), and Komarkova (1986).

Primary succession probably takes 400 to 500 years. Secondary succession is shorter, probably 75 to 150 years. The climax grass, Thurber fescue, is a long-lived, large bunchgrass which is an obligate outcrosser. This means that plants must be close enough together for pollen to move from one plant to another in order to set seed. When Thurber fescue plants are 3 to 4 meters or more apart, the pollen apparently cannot reach other plants, and the stand becomes non-reproductive. When the remaining Thurber fescue plants senesce and die, Thurber fescue is lost from the site, increasing erosion potential and creating a permanent disclimax.

Older Thurber fescue plants are somewhat palatable to grazing animals (livestock or big game), but are definitely not preferred if other grasses are available, such as Arizona fescue or young Thurber fescue plants. Under heavy use, cattle typically remove *all* of the Arizona fescue and young Thurber fescue plants before they begin to eat the older Thurber fescue plants. Sites are common on which big old Thurber plants are widely spaced, with nothing between them except Kentucky bluegrass, forbs, and bare ground. These sites look to be in fair condition, but all the reproduction of the climax grasses is being consumed every year. Under those conditions, Thurber fescue will be eliminated from the site when the old plants die, and if their demise is hastened by grazing on the old Thurber fescue plants, erosion, soil loss, and reduction of site value follow quickly.

Parry oatgrass complicates this situation, as in Community Types A and B. Parry oatgrass forms mats with a very tight root structure and is more palatable than either of the fescues. However, Parry oatgrass is more resistant to grazing because of its mat-forming habit, and is less productive than Thurber fescue. Parry oatgrass competes vigorously with other plants – it can easily outcompete Thurber fescue (or even sagebrush!), both of which are much taller plants. It is difficult to tell whether oatgrass is an obligate outcrosser because of its vigorous vegetative reproduction.

Tall willow riparian communities (or the “mountain meadows” seral to them) occur on adjacent wetter bottom sites. Mountain big sagebrush/Thurber fescue communities border this type on coarser soils. Aspen forests occur on steeper, better-drained slopes nearby, and spruce-fir forests occur on coarser, non-Mollic soils and

steeper, better-drained slopes. Arizona fescue/muhly or big sagebrush/Parry oatgrass-Arizona fescue communities occur on adjacent shallower-Mollic soils that do not support Thurber fescue. Osha forblands are found on adjacent dense-clay sites with few bunchgrasses.

Horizontal obstruction varies from very low to moderate, averaging moderately low. Deer and elk use these sites as summer range and sparingly for forage. There is little browse here, and not much cover. Deer and elk use of all community types is low in mild winters and very low in severe winters. Deer and elk use of all community types is moderate for forage and overnight stays spring through fall. Occasionally sage grouse come to this type on their summer range. Sage grouse use of all community types is very low in spring and for nesting, and low in the summer.

## Summary of Ecological Type Characteristics

1. Explanation of symbols in Appendix A. Percentages in [brackets] indicate the percentage of plots sampled that have that characteristic.

NUMBER OF SAMPLES	12, soil descriptions from 8 of these (total 12)
ELEVATION	10,072 ft (9,210-10,800 ft); 3,070 m (2,807-3,292 m)
AVERAGE ASPECT	133°M (r = 0.83)
LITHOLOGY	Mostly tuffs [64%], a variety of others
FORMATIONS <sup>1</sup>	Taf [77%], a variety of others
LANDFORMS	Soil creep slopes [85%]
SLOPE POSITIONS	Footslopes, toeslopes, and lower backslopes [93%]
SLOPE SHAPES	Linear [83%] horizontally, Concave [58%] to linear [25%] vertically
SLOPE ANGLE	17.3% (4-49%)
SOIL PARENT MATERIAL	Colluvial [92%]
COARSE FRAGMENTS	4.0% (1-19%) cover on surface, 50.2% (19-85%) by volume in soil
SOIL DEPTH	69 cm (46-87 cm); 27.2 in (18-34 in)
MOLLIC THICKNESS	37 cm (13-65 cm); 14.5 in (5-26 in)
TEXTURE	Mostly loam surface (loam-clay loam-sandy loam [70%]), Subsurface mostly clayey (sandy clay loam-clay-sandy clay-clay [75%])
SOIL CLASSIFICATION	All Cryoborolls, 90% Argic; All deep
TOTAL LIVE COVER	158.7% (105.8-201.4%).
NUMBER OF SPECIES	24.9 (20-36)
TOTAL LIVE COVER/NO. SPECIES	6.5% (4.6-9.5%)
CLIMATE	Outside rainshadow to in partial or deep rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine grassland.
WATER	The sites get significant snowfall. Much moisture is retained in the usually heavy layers of live vegetation and in the considerable litter layers. These sites may sometimes be adjacent to riparian areas.

## Key to Community Types

1. Parry oatgrass >35% cover ..... **A**
1. Parry oatgrass absent or <35% cover ..... (2)
2. Sedges sometimes absent, total sedge cover 0-10%. Parry oatgrass sometimes absent, 0-20% cover.  
Mountain muhly (MUMO) usually absent or <1% cover ..... **C**
2. Total sedge cover >10%. Parry oatgrass always present, 5-40% cover. Mountain muhly always  
present, T-25% cover ..... (3)
3. Thurber fescue >40% cover. Arizona fescue <12% cover..... **B**
3. Thurber fescue <40% cover, often <20%. Arizona fescue >12% cover, often >15%..... **D**

## Description of Community Types

- A** *Thurber fescue-Parry oatgrass-sedge* is dominated by Thurber fescue at >60% cover, with Parry oatgrass conspicuous at >35% cover. Arizona fescue and mountain muhly are both present but inconspicuous, <10% cover each. Total sedge cover is >15%.
- B** *Thurber fescue-Parry oatgrass-Arizona fescue* is dominated by Thurber fescue at >65% cover, with Arizona fescue and Parry oatgrass both conspicuous at >10% cover each. Total sedge cover is >10%.
- C** *Thurber fescue-Arizona fescue* is dominated by Thurber fescue at 10-95% cover, or by Arizona fescue at 5-50% cover. Parry oatgrass is usually absent, but sometimes occurs up to 15% cover. Mountain muhly is absent. Sedges are absent or minor; total sedge cover is <10%.
- D** *Parry oatgrass-Arizona fescue-blunt sedge-Thurber fescue* is dominated by a mixture of Arizona fescue at 10-55% cover and Parry oatgrass at 5-40% cover. Thurber fescue is less prominent, with Trace to 20% cover. Mountain muhly and sedges are always present, 5-25% cover each.

Table 20-5. Community types within *Thurber-Arizona fescues-Deep cold dark soils*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Layer Height, m Lr	Avg Layr Cvr %	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs	Obstruct'n %: 1.5-2.0 m 1.0-1.5 m 0.5-1.0 m 0.0-0.5 m Total<2m
A. Thurber fescue-Parry oatgrass-sedge-Arizona fescue	2	10,420 24.0 (19-29)	28 (19-37) 69 (69-69) 20 (20-20)	3 (2-4) 1 (1-1) PN	GF 0.80 (0.0-1.2) S 0.10 (0.0-0.2) M 0.0 L 0.0	98.2 1.2 0.2 0.1	0 (0-0) 2 (2-2) 144 (142-147) 25 (15-35)	25 (23-27) 172 (159-184) 6.9 (6.8-6.9)	44-49 3054-3056 36-214	*
B. Thurber fescue-Parry oatgrass-Arizona fescue	2	10,105 (10,080-10,130) 8.0 (4-12)	62 (38-85) 67 (53-81) 36 (29-43)	1 (1-1) 0 (0-1) LS	GF 0.8 (0.0-1.3) S 0.1 (0.0-0.3) M Missing L Missing	98.3 1.8 M M	0 (0-0) 1 (0-2) 142 (131-153) 26 (25-27)	22 (20-24) 169 (160-178) 7.8 (6.7-8.9)	0-47 3026-3051 90-113	0 0 0 40 10
C. Thurber fescue-Arizona fescue	4	9,673 (9,210-9,900) 20.8 (5-49)	56 (53-59) 76 (73-78) 62 (59-65)	3 (1-5) 18 (7-30) MS	GF 0.50 (0.0-1.3) S 0.35 (0.0-0.6) M Missing L Missing	94.6 5.6 M M	0 (0-0) 6 (0-11) 101 (80-116) 31 (8-64)	21 (20-23) 138 (106-190) 6.7 (4.6-9.5)	0-241 2168-2923 20-705	0 (0-0) 0 (0-0) 28 (25-30) 78 (60-95) 26 (21-31)
D. Parry oatgrass-Arizona fescue-blunt sedge-Thurber fescue	4	10,281 (10,080-10,800) 15.0 (8-28)	53 (44-74) 67 (46-87) 33 (13-55)	8 (2-19) 8 (2-12) MS-LM	GF 0.20 (0.0-0.9) S 0.20 (0.0-0.5) M 0.0 L 0.0	93.1 2.9 0.4 0.8	0 (0-0) 3 (0-7) 117 (96-151) 48 (22-83)	30 (24-36) 168 (118-201) 5.5 (4.9-5.8)	0-169 2596-3054 66-999	0 (0-0) 0 (0-0) 5 (0-20) 54 (25-75) 15 (6-24)

\*. Unknown: measurements were not taken in this CT.



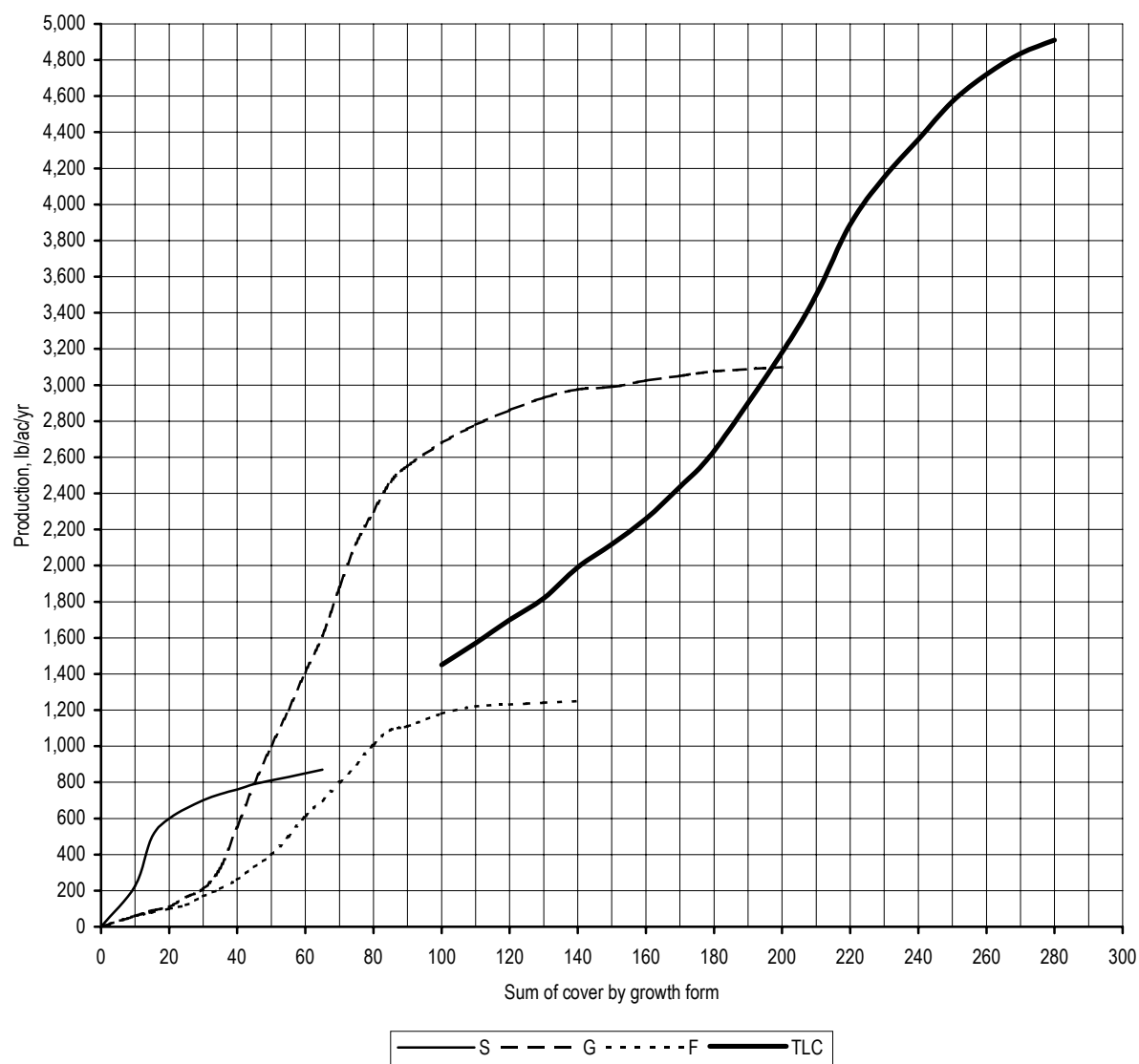


Figure 20-5. Relationship of cover by growth form and production. This is the FETHFEST (FETH-FESTU) model.  
S = shrubs, G = graminoids, F = forbs, and TLC = Total live cover.

Table 20-6. Resource Values for *Thurber-Arizona fescues-Deep cold dark soils*. Resource values were calculated from the numbers in Table 20-5, relative to the whole UGB.

The numbers in this table can be translated: 0 = Very Low, 1 = Low, 2 = Moderately Low, 3 = Moderate, 4 = Moderately High, 5 = High, and 6 = Very High.

Community Type				
Resource Value	A	B	C	D
Potential Cattle Forage Production	5	5	5	5
Grazing Suitability	4	5	5	5
Wetland	No	No	No	No
Riparian Area	No	No	No	No
Developed Recreation	2	2	3	2
Dispersed Recreation	3	3	4	3
Scenic	3-4	3-4	3-4	3-4
Road & Trail Stability	2-3	2-3	3-4	2-3
Construction Suitability	2	2	3	2
Deer & Elk Hiding Cover	1-2	0-1	2-3	0-2
Deer & Elk Forage & Browse	3-4	3-4	3-4	2-3
Need for Watershed Protection	2-3	2-3	2-3	2-3
Soil Stability	3-4	3-4	3-4	3-4
Risk of Soil Loss-Natural	2	2	2	2
Risk of Soil Loss-Management	3	3	3	3
Risk of Permanent Depletion-Range	3	3	3	3
Risk of Permanent Depletion-Wildlife	2	2	2	2
Resource Cost of Management	3	3	3	3
Cost of Rehabilitation	2	2	1-2	2



A Thurber fescue/Arizona fescue site (Community Type A), where the palatable decreaser grass, Parry oatgrass, shares dominance. This site is in a deep rainshadow, which may explain the presence of Parry oatgrass. Thurber fescue 74%, Parry oatgrass 40%, silvertop sedge 21%, mountain muhly 6%. Coarse Fragments Cover = 4%, Total Live Cover = 159%, Coarse Fragments in Soil = 19. Soil sampled as an Argic Cryoboroll, Loamy-Skeletal, Mixed. Note the bristlecone pine/Arizona fescue in the middleground.  
Elk Park Quadrangle, elevation 10,420 ft, 29% 118° (ESE) slope. August 11, 1992.

Table 20-7. Common Species in *Thurber-Arizona fescues-Deep cold dark soils*, where Characteristic cover > 10% or Constancy > 20%. "-" means that the species is not found. Dead cover is not listed. Ccv = Characteristic Cover, Con = Constancy. If Avc = Average Cover, then these are related using the formula  $Avc = Ccv \cdot 100\% / Con$ .

	Community Type	A	B	C	D	
		Ccv (Con)	Ccv (Con)	Ccv (Con)	Ccv (Con)	
Code	Species	N = 2	2	4	4	Common Name
SHRUBS						
CHPA13	Chrysothamnus parryi	—	—	10 (50)	1 (25)	Parry rabbitbrush
CHV18	Chrysothamnus viscidiflorus	2 (100)	—	—	4 (50)	Douglas rabbitbrush
PEFL15	Pentaphylloides floribunda	—	—	—	T (75)	shrubby cinquefoil
PIRI6	Picradenia richardsonii	—	—	1 (25)	1 (50)	pingue
GRAMINOIDS						
ACNE9	Achnatherum nelsonii	—	—	10 (25)	—	Nelson's needlegrass
BRCA10	Bromopsis canadensis	—	—	7 (50)	T (25)	fringed brome
CAOB4	Carex obtusata	18 (100)	15 (100)	6 (50)	16 (100)	blunt sedge
DAPA2	Danthonia parryi	45 (100)	14 (100)	15 (25)	23 (100)	Parry oatgrass
ELEL5	Elymus elymoides	T (50)	T (100)	4 (50)	2 (100)	bottlebrush squirreltail
ELTR7	Elymus trachycaulus	—	—	11 (25)	—	slender wheatgrass
FEAR2	Festuca arizonica	3 (100)	11 (100)	14 (100)	30 (100)	Arizona fescue
FESA	Festuca saximontana	1 (100)	20 (50)	—	5 (100)	Rocky Mountain fescue
FETH	Festuca thurberi	70 (100)	76 (100)	62 (100)	12 (100)	Thurber fescue
KOMA	Koeleria macrantha	T (50)	1 (100)	7 (50)	8 (100)	prairie junegrass
MUMO	Muhlenbergia montana	7 (100)	10 (100)	—	8 (100)	mountain muhly
POA	Poa	—	—	—	12 (50)	bluegrass
POFE	Poa fendleriana	—	—	T (25)	12 (50)	muttongrass
FORBS						
ACLA5	Achillea lanulosa	T (50)	5 (100)	3 (100)	6 (75)	western yarrow
ANRO2	Antennaria rosea	3 (100)	1 (50)	1 (25)	5 (100)	rose pussytoes
ARFR4	Artemisia frigida	—	T (50)	—	2 (50)	fringed sagewort
ERFE3	Eremogone fendleri	—	1 (100)	2 (25)	4 (100)	desert sandwort
ERFL	Erigeron flagellaris	—	1 (50)	—	7 (75)	trailing fleabane
ERSP4	Erigeron speciosus	14 (100)	—	—	3 (25)	Oregon fleabane
ERSU2	Erigeron subtrinervis	—	7 (50)	5 (100)	6 (100)	threenerve fleabane
ERVE2	Erigeron vetensis	—	—	—	14 (25)	early bluetop fleabane
ERUM	Eriogonum umbellatum	—	—	17 (50)	—	sulfur buckwheat
LUAR3	Lupinus argenteus	—	3 (50)	4 (50)	—	silvery lupine
OXLA3	Oxytropis lambertii	—	2 (50)	—	4 (50)	Lambert crazyweed
POHI6	Potentilla hippiana	3 (50)	2 (50)	3 (50)	9 (100)	horse cinquefoil
TAOF	Taraxacum officinale	—	1 (50)	T (50)	3 (75)	common dandelion
FORB	forb unknown	1 (100)	1 (50)	—	—	unknown forb
GROUND COVER						
.BARESO	bare soil	1 (100)	T (50)	18 (100)	8 (100)	
.LITTER	litter and duff	97 (100)	99 (100)	79 (100)	84 (100)	
GRAVEL	gravel 0.2-10 cm	1	1	2	4	
.COBBLE	cobble 10-25 cm	2 (100)	—	—	T (25)	
.STONES	stone > 25 cm	1 (50)	—	—	—	
.MOSSON	moss on soil	1 (50)	—	—	1 (50)	
LICHENS	lichens on soil	1	—	1	1	

Table 20-8. Wildlife values (relative to the whole UGB) for the principal wildlife species using <i>Thurber-Arizona fescues-Deep cold dark soils</i> .			
CT	Sage Grouse	Mule Deer	Elk
	Season-Preference	Season-Preference	Season-Preference
All	Spring- Very Low	Winter, Mild- Low	Winter, Mild- Low
	Nesting- Very Low	Winter, Severe- Very Low	Winter, Severe- Very Low
	Summer- Low	Spring/Fall- Moderate (Forage, Overnight)	Spring/Fall- Moderate (Forage, Overnight)

**THURBER-IDAHO FESCUES-DEEP COLD DARK SOILS**

Thurber fescue/Idaho fescue-Deep Argic Cryoborolls, not coarse on surface-  
Linear to concave toeslopes and footslopes, 9,500-11,200 ft

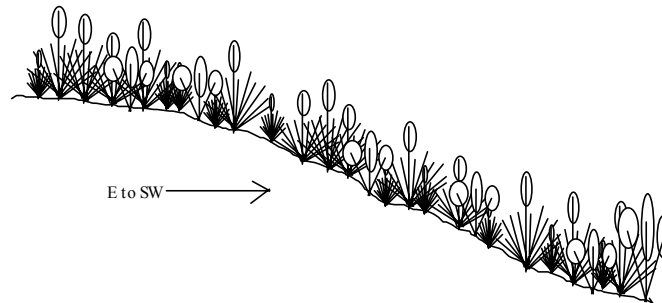


Figure 20-7. Cross-section of vegetation structure of *Thurber-Idaho fescues-Deep cold dark soils*. Aspects are southeasterly, and slope angles average 9%.

*Thurber-Idaho fescues-Deep cold dark soils* is a common type on toeslopes and footslopes in the middle to upper Subalpine, in areas with deep, dark (Mollic), clay-layered (Argillic) soils, usually outside the deep rainshadows. In the Gunnison Basin it occurs on colluvial ridges and benches. This type has also been described from northern Colorado. *Thurber-Idaho fescues-Deep cold dark soils* is characterized by Thurber fescue (FETH), Idaho fescue (FEID), and yarrow (ACLA5). Many sites also have Parry oatgrass (DAPA2) as well. See Table 20-12 for common species names and codes. Other distinguishing features include deep-loamy Cryoborolls which are moderately-drained to well-drained.

*Thurber-Idaho fescues-Deep cold dark soils* is related to *Thurber-Arizona fescues-Deep cold dark soils*, which occurs at somewhat lower elevations on somewhat steeper slopes, and supports Arizona fescue (FEAR2) instead of Idaho fescue. *Thurber-Idaho fescues-Deep cold dark soils* is also related to *Thurber fescue/moist forbs-Deep dark clay soils-Linear or concave slopes*, which occurs on deeper, less-coarse soils, and is dominated by forbs and Thurber fescue; both Arizona and Idaho fescues are absent or <1% cover.

*Thurber-Idaho fescues-Deep cold dark soils* is also related to *Douglas-fir/Thurber fescue-Cold dark soils-Gentle*, an open-forest type which occurs at lower elevations on steep slopes and coarser soils, and is dominated by Douglas-fir (PSME). *Thurber-Idaho fescues-Deep cold dark soils* is also related to *Aspen/Thurber fescue-Deep dark soils*, a forested type which occurs at lower elevations on somewhat coarser, shallower soils, and is dominated by aspen (POTR5).

The plant association *Festuca thurberi/Festuca idahoensis* was documented by Hess (1982). *Festuca thurberi/Festuca idahoensis* phase *Danthonia parryi* is described as new here.

Primary succession takes perhaps 400 to 500 years. Secondary succession is shorter, probably 75

to 150 years. The climax grass, Thurber fescue, is a long-lived large bunchgrass which is an obligate outcrosser. This means that plants must be close enough together for pollen to transfer from one plant to another in order to set seed. When Thurber fescue plants are 3 to 4 m or more apart, pollen cannot reach other plants and the stand becomes non-reproductive. When the remaining Thurber fescue plants senesce and die, Thurber fescue is lost from the site, increasing erosion potential and creating a permanent disclimax.

Older Thurber fescue plants are somewhat palatable to grazing animals (livestock or big game), but are definitely not preferred if other grasses are available. Idaho fescue or young Thurber fescue plants are much more palatable. Under heavy grazing, cattle typically remove all of the Idaho fescue and young Thurber fescue plants before they begin to eat the older Thurber fescue plants. Sites are common on which big old Thurber fescue plants are widely spaced with nothing between them but Kentucky bluegrass, forbs, and bare ground. These sites look fully vegetated, but the reproduction of the climax grasses is being consumed every year. Under those conditions, Thurber fescue will be eliminated when the old plants die, and if their demise is hastened by grazing, erosion, soil loss, and reduction of site value follows quickly.

This situation is somewhat complicated when Parry oatgrass is present (in Community Type A). Parry oatgrass is a mat-forming grass with a very tight root structure, and it is more palatable than either of the fescues on these sites, but it is more resistant to grazing because of its mat-forming habit, and it is less productive than Thurber fescue. Parry oatgrass is a vigorous competitor with other plant species. It easily outcompetes Thurber fescue (or even sagebrush!), both much taller plants. It is difficult to determine whether Parry oatgrass is an obligate outcrosser because of its vigorous vegetative reproduction.

Cattle make extensive use of these grasslands, and the sites are also good domestic sheep range. Proper grazing management is easy to measure by the abundance of young Thurber fescue and Idaho fescue plants. Willow (either tall or short) riparian communities, or the “mountain meadows” seral to them, occur on adjacent wetter bottom sites. Mountain big sagebrush/Thurber fescue communities border this type on coarser soils. Aspen forests dominate adjacent steeper, better-drained slopes, and spruce-fir forests occur on coarser, non-Mollic soils and steeper, better-drained slopes. Arizona fescue/muhly or big sagebrush/Parry oatgrass-Arizona fescue communities adjoin this type on shallower-Mollic

soils that cannot support Thurber fescue. Osha forblands occur on adjacent dense-clay sites with few bunchgrasses.

Horizontal obstruction varies from low to moderately low. Deer and elk use these sites sparingly for forage during the summer. There is little browse here, and not much cover. Deer and elk use of all community types is low during mild winters, very low during severe winters, and moderate spring through fall for forage and overnight stays. The sites are too high and snowy for sage grouse habitat, although a few may be seen here occasionally in summer. Sage grouse use of all community types is very low in spring and for nesting and low in summer.

## Summary of Ecological Type Characteristics

1. Explanation of symbols in Appendix A. Percentages in [brackets] indicate the percentage of plots sampled that have that characteristic.

NUMBER OF SAMPLES	12, soil descriptions from 5 of these (total 12)
ELEVATION	10,212 ft (9,500-11,120 ft); 3,112 m (2,895-3,389 m)
AVERAGE ASPECT	141°M (r = 0.59)
LITHOLOGY	Mostly tuff and basalt [75%], some sedimentaries or granite
FORMATIONS <sup>1</sup>	Taf-Tbb-Tpl-Tmi [81%] or Km-PPm-Pmb [19%]
LANDFORMS	Predominantly soil creep slopes [55%] and slump-earthflows [18%]
SLOPE POSITIONS	Mostly toeslopes, footslopes, and lower backslopes [80%]
SLOPE SHAPES	Linear [64%] to undulating [18%] horizontally, Concave [64%] to linear [36%] vertically
SLOPE ANGLE	9.2% (2-31%)
SOIL PARENT MATERIAL	Mostly colluvium [64%] and a variety of others
COARSE FRAGMENTS	2.5% (0-9%) cover on surface, 44.5% (30-55%) by volume in soil
SOIL DEPTH	68 cm (41-116 cm); 26.6 in (16-46 in)
MOLLIC THICKNESS	45 cm (18-116 cm); 17.6 in (7-46 in)
TEXTURE	Loamy surface (loam-silty loam [86%]), subsurface is loamy (sandy clay loam-silty clay loam-sandy loam [57%]) to clayey (clay-clay loam-sandy clay [43%])
SOIL CLASSIFICATION	All Cryoborolls, mostly Pachic [89%]
TOTAL LIVE COVER	144.8% (89.5-217.6%)
NUMBER OF SPECIES	26.8 (18-34)
TOTAL LIVE COVER/NO. SPECIES	5.6% (3.5-11.7%)
CLIMATE	Outside rainshadow or in partial or deep rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine grassland.
WATER	Snowfall is considerable. Heavy layers of live vegetation and litter layers retain moisture. These sites may be adjacent to riparian areas.

## Key to Community Types

1. Parry oatgrass conspicuous to abundant, >5% cover, often >25%. Idaho fescue >5% cover, often >10%.....**A**
1. Parry oatgrass usually absent, rarely <1% cover. Idaho fescue absent or <15% cover.....(2)
2. Thurber fescue dominant, >25% cover, often >40%. Total graminoid cover >75%.....**B**
2. Thurber fescue absent to minor, 0-10% cover. Total graminoid cover <75%, often <50%.....**C**

## Description of Community Types

- A** *Parry oatgrass-Idaho fescue-Thurber fescue* is dominated by Parry oatgrass, 5-65% cover, Idaho fescue, 5-75% cover, and Thurber fescue, 5-25% cover. Total graminoid cover is 75-120%, and total live cover is 85-185%.
- B** *Thurber fescue-Idaho fescue* is dominated by Thurber fescue, 40-85% cover. Idaho fescue is a constant subdominant, 5-20% cover. Yarrow or slender wheatgrass (ELTR7) is sometimes abundant, >10% cover. Total graminoid cover is 90-120%, and total live cover is 100-220%.
- C** *Sparse fescue-yarrow-beauty cinquefoil* usually has Idaho fescue or Thurber fescue sparse, <10% cover. The only constant is slender wheatgrass, 2-10% cover. Total graminoid cover is 50%, and total live cover is <120%.

## Communities Not Assigned to a Community Type

- A community dominated by Kentucky bluegrass (POPR), elk sedge (CAGE2), and dry forbs such as silvery lupine (LUAR3), dandelion (TAOF), or beauty cinquefoil (POPU9). Thurber fescue is present in small amounts.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Layer Height, m Lr	Avg Layer Cvr %	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs	Obstruct'n %: 1.5-2.0 m 1.0-1.5 m 0.5-1.0 m 0.0-0.5 m Total<2m
A. Parry oatgrass-Idaho fescue-Thurber fescue	4	10,545 (10,320-11,120) 10.8 (3-16)	49 (43-55) 57 (51-62) 28 (18-38)	4 (2-9) 17 (8-21) LS	S 0.55 (0.2-1.2) GF 0.38 (0.0-1.2) M 0.0 L 0.0	T 99.3 0.6 1.1	1 (0-2) 0 (0-1) 94 (76-104) 39 (11-74)	28 (24-34) 133 (90-177) 4.7 (3.6-6.4)	0-11 2045-2757 25-874	0 0 0 60 15
B. Thurber fescue-Idaho fescue	5	9,936 (9,500-10,920) 10.6 (2-31)	41 (30-48) 84 (67-116) 57 (25-116)	1 (0-3) 21 (9-34) LM	S 0.45 (0.0-0.7) GF 0.42 (0.0-1.2) M 0.0 L Missing	1.2 92.9 0.2 M	0 (0-0) 5 (0-20) 110 (95-147) 60 (10-112)	25 (18-30) 175 (105-218) 7.2 (5.3-11.7)	0-458 2574-3056 24-1256	0 (0-0) 0 (0-0) 10 (0-15) 85 (80-90) 24 (20-26)
C. Sparse fescue-yarrow-dandelion-beauty cinquefoil	3	10,227 (9,700-10,920) 4.7 (2-9)	* 41 41	2 (1-5) 43 (30-60) EM	*		0 (0-0) 24 (0-72) 25 (14-43) 62 (27-95)	28 (26-30) 110 (106-116) 4.0 (3.5-4.3)	0-870 136-757 107-1133	*

\*. Unknown: measurements were not taken in this CT.

CT	Sage Grouse Season-Preference	Mule Deer Season-Preference	Elk Season-Preference
All	Spring- Very Low Nesting- Very Low Summer- Low	Winter, Mild- Low Winter, Severe- Very Low Spring/Fall- Moderate (Forage, Overnight)	Winter, Mild- Low Winter, Severe- Very Low Spring/Fall- Moderate (Forage, Overnight)

Table 20-11. Resource Values for <i>Thurber-Idaho fescues-Deep cold dark soils</i> . Resource values were calculated from the numbers in Table 20-9, relative to the whole UGB.			
The numbers in this table can be translated: 0 = Very Low, 1 = Low, 2 = Moderately Low, 3 = Moderate, 4 = Moderately High, 5 = High, and 6 = Very High.			
Community Type			
Resource Value	A	B	C
Potential Cattle Forage Production	5	5	2-3
Grazing Suitability	5	5	3
Wetland	No	No	No
Riparian Area	No	No	No
Developed Recreation	2	2	2
Dispersed Recreation	3	3	3
Scenic	3-4	3-4	2-3
Road & Trail Stability	2-3	2-3	2-3
Construction Suitability	2	2	2
Deer & Elk Hiding Cover	1	1-2	1-2
Deer & Elk Forage & Browse	3-4	3-4	2-3
Need for Watershed Protection	2-3	2-3	2-3
Soil Stability	3-4	3-4	3-4
Risk of Soil Loss-Natural	2	2	2
Risk of Soil Loss-Management	3	3	3
Risk of Permanent Depletion-Range	3	3	3
Risk of Permanent Depletion-Wildlife	2	2	2
Resource Cost of Management	3	3	3
Cost of Rehabilitation	2	2	2



A Thurber fescue/Idaho fescue site (Community Type A) in the high Subalpine. Note the shorter Thurber fescue, much more matted by recent snowbanks, at this colder, higher-elevation site. Parry oatgrass 28%, Thurber fescue 23%, Idaho fescue 21%, silvertop sedge 13%, Arizona fescue 5%. Coarse Fragments Cover = 3%, Total Live Cover = 160%, Coarse Fragments in Soil = 22. Soil sampled as an Argic Cryoboroll, Loamy-Skeletal over Clayey-Skeletal, Mixed. Cannibal Plateau Quadrangle, elevation 11,120 ft, 16% 172° (S) slope. July 20, 1993.



Another Thurber fescue/Idaho fescue site (Community Type B). Thurber fescue 78% cover, rubber rabbitbrush 20%, Idaho fescue 8%. Curecanti Needle Quadrangle, elevation 9,545 ft, 2% SW-facing slope. September 30, 1982.

Table 20-12. Common Species in *Thurber-Idaho fescues-Deep cold dark soils*, where Characteristic cover > 10% or Constancy > 20%. "-" means that the species is not found. Dead cover is not listed. Ccv = Characteristic Cover, Con = Constancy. If Avc = Average Cover, then these are related using the formula  $Avc = Ccv \cdot 100\% / Con$ .

Community Type		A		B		C	
Code	Species	Ccv (Con) N = 4		Ccv (Con) 5		Ccv (Con) 3	Common Name
SHRUBS							
CHNA2	<i>Chrysothamnus nauseosus</i>	-	-	20 (20)		-	rubber rabbitbrush
CHPA13	<i>Chrysothamnus parryi</i>	-	-	-	-	72 (33)	Parry rabbitbrush
PEFL15	<i>Pentaphylloides floribunda</i>	T	(75)	4 (20)		-	shrubby cinquefoil
GRAMINOIDS							
BRPO5	<i>Bromopsis porteri</i>	T	(50)	7 (60)		10 (67)	nodding brome
CAGE2	<i>Carex geyeri</i>	2	(50)	11 (40)		T (33)	elk sedge
DAPA2	<i>Danthonia parryi</i>	32	(100)	-	-	-	Parry oatgrass
ELTR7	<i>Elymus trachycaulus</i>	-	-	14 (80)		5 (100)	slender wheatgrass
FEID	<i>Festuca idahoensis</i>	28	(100)	12 (100)		4 (67)	Idaho fescue
FETH	<i>Festuca thurberi</i>	13	(100)	59 (100)		1 (67)	Thurber fescue
KOMA	<i>Koeleria macrantha</i>	7	(75)	2 (20)		3 (33)	prairie junegrass
POFE	<i>Poa fendleriana</i>	10	(50)	1 (60)		7 (67)	muttongrass
POPR	<i>Poa pratensis</i>	T	(25)	27 (40)		-	Kentucky bluegrass
TRSP2	<i>Trisetum spicatum</i>	-	-	1 (20)		3 (67)	spike trisetum
FORBS							
ACLA5	<i>Achillea lanulosa</i>	2	(100)	11 (100)		6 (100)	western yarrow
AGGL	<i>Agoseris glauca</i>	3	(75)	2 (20)		1 (67)	false-dandelion
ANSE4	<i>Androsace septentrionalis</i>	T	(25)	T (40)		T (67)	northern rock-jasmine
ANRO2	<i>Antennaria rosea</i>	4	(50)	-	-	T (33)	rose pussytoes
BODR	<i>Boechera drummondii</i>	1	(25)	T (60)		T (100)	false-arabis
DUHO	<i>Dugaldia hoopesii</i>	-	-	14 (40)		39 (67)	orange sneezeweed
ERFO3	<i>Erigeron formosissimus</i>	19	(25)	-	-	-	beautiful fleabane
ERSU2	<i>Erigeron subtrinervis</i>	1	(25)	1 (40)		-	threenerve fleabane
ERVE2	<i>Erigeron vetensis</i>	14	(25)	-	-	-	early bluetop fleabane
ERTR19	<i>Erythrocoma triflora</i>	3	(50)	5 (40)		-	prairie smoke
FRVI	<i>Fragaria virginiana</i>	-	-	12 (40)		1 (100)	Virginia strawberry
GADR3	<i>Gastrolychnis drummondii</i>	1	(50)	-	-	1 (67)	alpine campion
LAL2	<i>Lathyrus leucanthus</i>	-	-	4 (100)		2 (33)	aspen peavine
LUAR3	<i>Lupinus argenteus</i>	-	-	13 (60)		10 (33)	silvery lupine
NOMO2	<i>Nocca montana</i>	T	(25)	T (20)		1 (67)	candytuft
OXDE2	<i>Oxytropis deflexa</i>	3	(75)	-	-	-	stemless-loco
POHI6	<i>Potentilla hippiana</i>	8	(100)	-	-	1 (33)	horse cinquefoil
POPU9	<i>Potentilla pulcherrima</i>	-	-	5 (60)		3 (100)	beauty cinquefoil
PSMO	<i>Pseudocymopterus montanus</i>	3	(75)	-	-	T (33)	mountain parsely
TAOF	<i>Taraxacum officinale</i>	3	(100)	10 (60)		3 (100)	common dandelion
VIAM	<i>Vicia americana</i>	-	-	3 (80)		2 (33)	American vetch
GROUND COVER							
.BARESO	bare soil	17	(100)	21 (100)		43 (100)	
.LITTER	litter and duff	79	(100)	77 (100)		54 (100)	
.GRAVEL	gravel 0.2-10 cm	3		1		-	
.COBBLE	cobble 10-25 cm	1	(25)	-	-	-	
.STONES	stone > 25 cm	-	-	-	-	-	
.MOSSON	moss on soil	1	(25)	1 (20)		-	
.LICHENS	lichens on soil	1		2		1	



### THURBER FESCUE/MOIST FORBS–DEEP DARK CLAY SOILS–LINEAR OR CONCAVE SLOPES

Thurber fescue/meadow-rue-vetch-elk sedge–  
Deep to very deep Argic Cryoborolls, sometimes Pachic, not coarse on surface–  
Linear to concave backslopes and footslopes, 8,700-11,300 ft

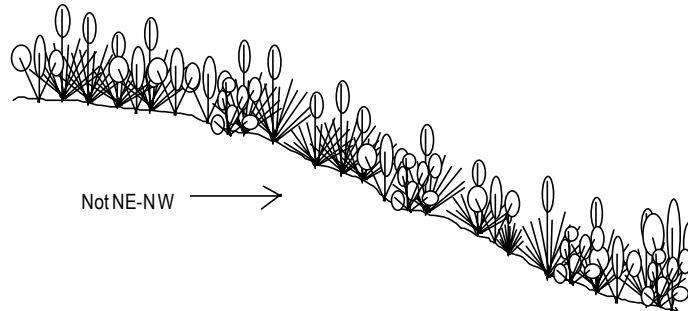


Figure 20-7. Cross-section of vegetation structure of *Thurber fescue*/moist forbs–Deep dark clay soils–Linear or concave slopes. Aspects are southeasterly, and slope angles average 16%.

*Thurber fescue*/moist forbs–Deep dark clay soils–Linear or concave slopes is a common type on gentle subalpine slopes, with deep to very deep, dark (Mollic), clay-limiting (Argillic) soils, usually outside the deep rainshadows. In the Gunnison Basin, it occurs on slumps and benches, and in parks outside the rainshadow climates. This type has also been described from other areas in western and northern Colorado. *Thurber fescue*/moist forbs–Deep dark clay soils–Linear or concave slopes is characterized by *Thurber fescue* (FETH), meadow-rue (THFE), elk sedge (CAGE2), and a wide variety of other moist-site forbs, such as blue flax (ADLE), Oregon fleabane (ERSP4), and nodding helianthella (HEQU2). See Table 20-16 for common species names and codes. Other distinguishing features include succulent forbs (meadow-rue, vetch, osha) and Pachic Cryoborolls which are poorly-drained to moderately-drained soils.

*Thurber fescue*/moist forbs–Deep dark clay soils–Linear or concave slopes is related to *Thurber-Idaho fescues–Deep cold dark soils*, which occurs on somewhat shallower, coarser soils, is dominated by graminoids instead of forbs, and supports conspicuous Idaho fescue (FEID). *Thurber fescue*/moist forbs–Deep dark clay soils–Linear or concave slopes is also related to *Osha–Very deep heavy-clay soils*, which occurs at somewhat lower elevations on much less coarse Alfisols, is dominated almost entirely by forbs with very few graminoids. *Thurber fescue*/moist forbs–Deep dark clay soils–Linear or concave slopes is also related to *Aspen/meadow-rue-peavine–Deep dark clay soils*, a forested type that occurs at somewhat lower elevations on somewhat shallower, coarser soils.

The plant association *Festuca thurberi*/*Thalictrum fendleri*-*Vicia americana*-*Carex geyeri*, described as new here, is based on *Festuca thurberi*/*Vicia americana*-*Lathyrus*

*leucanthus* (Boyce 1977, Hess 1981-1982). *Festuca thurberi*/*Thalictrum fendleri*-*Vicia americana*-*Carex geyeri* phase *Valeriana capitata*-*Adenolinum lewisii* is described as new here. *Festuca thurberi*/*Thalictrum fendleri*-*Vicia americana*-*Carex geyeri* phase *Ligusticum porteri* is described as new here.

Primary succession may take 400 to 500 years. Secondary succession is shorter, probably 75 to 150 years. The climax grass, *Thurber fescue*, is a long-lived large bunchgrass which is an obligate outcrosser. This means that plants must be close enough together for pollen to transfer from one plant to another in order to set seed. When *Thurber fescue* plants are 3 to 4 m or more apart, pollen cannot reach other plants, and the stand becomes non-reproductive. When the remaining *Thurber fescue* plants senesce and die, *Thurber fescue* is lost from the site, increasing erosion potential and creating a permanent disclimax.

Older *Thurber fescue* plants are somewhat palatable to grazing animals (livestock or big game), but are definitely not preferred if other grasses are available. Succulent forbs or young *Thurber fescue* plants are much more palatable. Under heavy grazing, cattle typically remove all of the palatable forbs and young *Thurber fescue* plants before begin to eat older *Thurber fescue* plants. Such sites are common in which big, old *Thurber fescue* plants are widely spaced with nothing between them except Kentucky bluegrass, unpalatable forbs, and bare ground. These sites seem to be fully vegetated, but all of the reproduction of the climax grasses is consumed every year. Under those conditions, *Thurber fescue* will be eliminated when the old plants die, and if their demise is hastened by grazing – erosion, soil loss, and reduction of site value follows quickly.

Willow (either tall or short) riparian communities, or the “mountain meadows” seral to

them, occur on adjacent wetter bottom sites. Mountain big sagebrush/Thurber fescue communities adjoin this type on coarser soils. Aspen forests occur on steeper, better-drained slopes, and spruce-fir forests border this type on coarser, non-Mollic soils and steeper, better-drained slopes. Arizona fescue/muhly or big sagebrush/Parry oatgrass-Arizona fescue communities occur on adjacent shallower-Mollic soils that do not support Thurber fescue. Osha forblands occur on adjacent dense-clay sites with few bunchgrasses.

Horizontal obstruction varies from low to moderate, averaging moderately low. Deer and elk use these sites sparingly for forage in the summer. There is little browse here, and not much cover. Deer and elk use of all community types is low during mild winters, very low during severe winters, and moderate spring through fall for forage and overnight stays. Occasionally a sage grouse will get here on its summer range. Sage grouse use of all community types is very low in spring and for nesting, and low in the summer.

## Summary of Ecological Type Characteristics

1. Explanation of symbols in Appendix A. Percentages in [brackets] indicate the percentage of plots sampled that have that characteristic.

NUMBER OF SAMPLES	12, soil descriptions from 9 of these (total 12)
ELEVATION	10,024 ft (8,700-11,240 ft); 3,055 m (2,652-3,426 m)
AVERAGE ASPECT	140°M (r = 0.25)
LITHOLOGY	A wide variety of lithologies, including sedimentary sandstone-shale-mudstone-limestone [57%] and igneous granite-gneiss-schist-breccia-basalt-tuff [43%]
FORMATIONS <sup>1</sup>	A wide variety
LANDFORMS	Mostly soil creep slopes [58%] and slump-earthflows [25%]
SLOPE POSITIONS	Lower backslopes, footslopes, and toeslopes [69%]
SLOPE SHAPES	Linear [64%] to undulating [18%] horizontally, Concave [64%] to undulating [18%] vertically
SLOPE ANGLE	15.7% (4-30%)
SOIL PARENT MATERIAL	Mostly colluvium [73%], a variety of others
COARSE FRAGMENTS	2.0% (0-8%) cover on surface, 24.0% (1-53%) by volume in soil
SOIL DEPTH	101 cm (52-190 cm); 39.9 in (20-75 in)
MOLLIC THICKNESS	48 cm (18-94 cm); 19.0 in (7-37 in)
TEXTURE	Loamy surface (loam-clay loam-sandy loam [80%]), subsurface is clayey (clay loam-clay-silty clay-sandy clay [75%])
SOIL CLASSIFICATION	All Argic Cryoborolls, some Pachic [50%], deep [56%] to very deep [44%]
TOTAL LIVE COVER	221.5% (129.0-334.3%)
NUMBER OF SPECIES	30.7 (20-39)
TOTAL LIVE COVER/NO. SPECIES	7.5% (4.0-11.9%)
CLIMATE	Outside rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine grassland.
WATER	The sites get significant snowfall. Heavy layers of live vegetation and litter layers retain much moisture. These sites may be adjacent to riparian areas.

## Key to Community Types

1. Total forb cover >80%, often >95%. Total live cover >200%. Thurber fescue 40-100% cover ..... (2)
1. Total forb cover <80%, often <60%. Total live cover <200%. Thurber fescue >70% cover ..... **C**
2. Thurber fescue <50% cover ..... **B**
2. Thurber fescue >50% cover ..... **A**

## Descriptions of Community Types

- A** *Thurber fescue-yarrow-vetch-valerian-meadow-rue* is dominated by Thurber fescue at 50-95% cover, with yarrow and moist-site forbs such as sharpleaf valerian (VACAA), vetch (VIAM), osha (LIPO), Oregon fleabane (ERSP4), or aspen peavine (LAL2) conspicuous. Total forb cover is 90-190%.
- B** *Thurber fescue-elk sedge-slender wheatgrass-dense forbs* is dominated by Thurber fescue at 30-50% cover, with slender wheatgrass and elk sedge prominent at >15% each. Forbs such as those listed for CT A are also conspicuous. Total forb cover is 100-130%.
- C** *Thurber fescue-yarrow-forbs* is dominated by Thurber fescue at 60-95% cover, with less cover by forbs. Letterman needlegrass (ACLE9) is sometimes prominent at >20% cover.

## Communities Not Assigned to a Community Type

- One community was dominated by Thurber fescue, but included only minor amounts (<5%) of all other species. The sites is just below timberline, and the community has tufted hairgrass (DECE) and alpine fescue (FEBRC), so perhaps this community is related to *Tufted hairgrass/alpine avens* (Alpine type E) or *Timber oatgrass-Shallow soils-Exposed high ridges*.
- One community was dominated by elk sedge and dry-site to moist-site forbs. Thurber fescue was present in small amounts.

Table 20-13. Community types within *Thurber fescue/moist forbs-Deep dark clay soils*.

Community Type	No. samples	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Layer Height, m	Avg Layer Cvr %	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs	Obstruct'n %: 1.5-2.0 m 1.0-1.5 m 0.5-1.0 m 0.0-0.5 m Total<2m
A. Thurber fescue-yarrow-vetch-valerian-meadow-rue	6	10,315 (9,800-11,240) 15.5 (4-30)	23 (1-53) 123 (56-190) 46 (18-60)	4 4 (2-20) LS	S 0.65 (0.0-1.2) GF 0.68 (0.0-1.7) M 0.0 L Missing	T 98.2 M 0.7 M	0 (0-0) 0 (0-2) 135 (109-153) 120 (96-181)	31 (24-38) 255 (216-334) 8.4 (5.7-11.5)	0-48 2827-3055 1138-1325	0 (0-0) 3 (0-10) 39 (10-95) 89 (80-100) 33 (23-51)
B. Thurber fescue-elk sedge-slender wheatgrass-dense forbs	2	10,420 11	31 65 25	1 10 LM	S 0.5 (0.0-0.7) GF 0.3 (0.0-0.7) M Missing L Missing	T 97 M M	1 (0-2) 8 (0-16) 126 (116-136) 107 (105-109)	29 (20-37) 242 (238-245) 9.3 (6.6-11.9)	0-355 2919-3046 1212-1238	0 0 0 65 16
C. Thurber fescue-yarrow-forbs	4	9,489 (8,700-10,315) 17.2 (7-27)	24 (12-39) 78 (52-104) 60 (33-94)	1 (0-1) 8 (1-25) MS	S 0.5 (0.0-0.8) GF 0.45 (0.0-1.3) M 0.0 L 0.0	9.3 98.0 0.6 0.1	0 (0-0) 6 (0-14) 125 (103-154) 31 (18-59)	31 (23-39) 161 (129-178) 5.4 (4.0-7.5)	0-330 2736-3050 42-630	0 (0-0) 0 (0-0) 25 (10-40) 88 (80-95) 28 (23-34)

Table 20-14. Wildlife values (relative to the whole UGB) for the principal wildlife species using *Thurber fescue/moist forbs-Deep dark clay soils*.

CT	Sage Grouse	Mule Deer	Elk
	Season-Preference	Season-Preference	Season-Preference
All	Spring- Very Low Nesting- Very Low Summer- Low	Winter, Mild- Low Winter, Severe- Very Low Spring/Fall- Moderate (Forage, Overnight)	Winter, Mild- Low Winter, Severe- Very Low Spring/Fall- Moderate (Forage, Overnight)

Table 20-15. Resource Values for <i>Thurber fescue/moist forbs-Deep dark clay soils</i> . Resource values were calculated from the numbers in Table 20-13, relative to the whole UGB.			
The numbers in this table can be translated: 0 = Very Low, 1 = Low, 2 = Moderately Low, 3 = Moderate, 4 = Moderately High, 5 = High, and 6 = Very High.			
Community Type			
Resource Value	A	B	C
Potential Cattle Forage Production	5	5	5
Grazing Suitability	5	5	5
Wetland	No	No	No
Riparian Area	No	No	No
Developed Recreation	2	2	2
Dispersed Recreation	3	3	3
Scenic	3-4	3-4	3-4
Road & Trail Stability	1-2	1-2	1-2
Construction Suitability	1	1	1
Deer & Elk Hiding Cover	1-3	1	1-2
Deer & Elk Forage & Browse	3-4	3-4	3-4
Need for Watershed Protection	3	3	3
Soil Stability	2-3	2-3	2-3
Risk of Soil Loss-Natural	2	2	2
Risk of Soil Loss-Management	3-4	3-4	3-4
Risk of Permanent Depletion-Range	3	3	3
Risk of Permanent Depletion-Wildlife	2	2	2
Resource Cost of Management	3-4	3-4	3-4
Cost of Rehabilitation	2	2	2



A *Thurber fescue/meadow-rue-vetch-elk sedge* site (Community Type C). *Thurber fescue* 92% cover, *Letterman needlegrass* 21%, *nodding brome* 11%, *slender wheatgrass* 6%, *vetch* 4%. Coarse Fragments Cover = 1%, Total Live Cover = 166%, Coarse Fragments in Soil = 6, Bare Soil Cover = 2%. Soil sampled as an Argic Pachic Cryoboroll, Fine-Loamy, Mixed. Big Soap Park Quadrangle, elevation 8,700 ft, 20% E-facing slope. September 21, 1992.



Another *Thurber fescue/meadow-rue* site, this time with conspicuous *valerian*. *Thurber fescue* 77% cover, *elk sedge* 35%, *yarrow* 47%, *tall larkspur* 23%, *sharp-leaf valerian* 21%, *nodding brome* 18%, *muttongrass* 14%. Soil sampled as a Argic Pachic Cryoboroll, Fine, Smectitic. Almont quadrangle, elevation 10,390 ft, 4% 070° (ENE) slope. July 27, 1993.

Table 20-16. Common Species in *Thurber fescue/moist forbs–Deep dark clay soils*, where Characteristic cover > 10% or Constancy > 20%. "–" means that the species is not found. Dead cover is not listed. Ccv = Characteristic Cover, Con = Constancy. If Avc = Average Cover, then these are related using the formula  $Avc = Ccv \cdot 100\% / Con$ .

Community Type		A		B		C		Common Name
Code	Species	Ccv (Con) N = 6		Ccv (Con) 2		Ccv (Con) 4		
SHRUBS								
CHV18	Chrysothamnus viscidiflorus	T (17)		–	–	10 (50)		Douglas rabbitbrush
MARE11	Mahonia repens	–	–	15 (50)		–	–	Oregon-grape
GRAMINOIDS								
ACLE9	Achnatherum lettermanii	–	–	–	–	15 (75)		Letterman needlegrass
ACNE9	Achnatherum nelsonii	2 (67)		–	–	1 (50)		Nelson's needlegrass
BRCA10	Bromopsis canadensis	10 (67)		5 (50)		7 (50)		fringed brome
BRPO5	Bromopsis porteri	16 (33)		12 (50)		5 (25)		nodding brome
BRPU9	Bromopsis pumpelliana	22 (33)		–	–	6 (25)		Pumpelly brome
CAREX	Carex	18 (33)		–	–	8 (50)		sedge
CAFO3	Carex foenea	28 (17)		–	–	–	–	silvertop sedge
CAGE2	Carex geyeri	32 (33)		28 (100)		22 (50)		elk sedge
CAHO5	Carex hoodii	13 (33)		–	–	–	–	Hood sedge
ELTR7	Elymus trachycaulus	10 (100)		23 (100)		5 (100)		slender wheatgrass
FETH	Festuca thurberi	71 (100)		42 (100)		80 (100)		Thurber fescue
KOMA	Koeleria macrantha	–	–	1 (50)		1 (50)		prairie junegrass
POFE	Poa fendleriana	8 (33)		11 (100)		2 (50)		muttongrass
PONE12	Poa nemoralis ssp. interior	–	–	17 (50)		–	–	interior bluegrass
FORBS								
ACLA5	Achillea lanulosa	21 (100)		15 (50)		7 (100)		western yarrow
ADLE	Adenolinum lewisii	7 (83)		5 (50)		3 (25)		blue flax
AGGL	Agoseris glauca	2 (83)		30 (50)		1 (50)		false-dandelion
ANSE4	Androsace septentrionalis	1 (33)		–	–	T (50)		northern rock-jasmine
AQCO	Aquilegia coerulea	T (50)		T (50)		–	–	Colorado columbine
BODR	Boechera drummondii	1 (17)		–	–	T (75)		false-arabis
CAGU	Calochortus gunnisonii	1 (33)		1 (50)		3 (25)		Gunnison mariposa
CIRSI	Cirsium	14 (17)		–	–	–	–	thistle
DEBA2	Delphinium barbeyi	23 (17)		T (50)		–	–	Barbey larkspur
ERCO24	Eremogone congesta	1 (33)		20 (50)		4 (25)		desert sandwort
ERSP4	Erigeron speciosus	18 (67)		1 (50)		–	–	Oregon fleabane
ERSU2	Erigeron subtrinnervis	2 (17)		10 (50)		6 (50)		threeerve fleabane
ERTR19	Erythrocoma triflora	4 (50)		–	–	–	–	prairie smoke
FRVI	Fragaria virginiana	2 (33)		1 (50)		2 (25)		Virginia strawberry
GASE6	Galium septentrionale	2 (67)		T (50)		3 (25)		northern bedstraw
GERI	Geranium richardsonii	7 (17)		T (50)		3 (50)		Richardson geranium
HEQU2	Helianthella quinquenervis	1 (50)		15 (50)		–	–	nodding helianthella
HEVI4	Heterotheca villosa	4 (17)		20 (50)		–	–	hairy golden aster
LALE2	Lathyrus leucanthus	14 (50)		10 (50)		2 (75)		aspen peavine
LIPO	Ligusticum porteri	24 (17)		–	–	–	–	osha
LUAR3	Lupinus argenteus	11 (33)		20 (50)		8 (25)		silvery lupine
POHI6	Potentilla hippiana	28 (17)		–	–	1 (50)		horse cinquefoil
POPU9	Potentilla pulcherrima	8 (67)		5 (100)		1 (75)		beauty cinquefoil
SOMU	Solidago multiradiata	13 (50)		–	–	–	–	mountain goldenrod
TAOF	Taraxacum officinale	11 (50)		4 (50)		1 (100)		common dandelion
THFE	Thalictrum fendleri	5 (67)		–	–	6 (25)		Fendler meadow-rue
VACAA	Valeriana capitata ssp. acutiloba	13 (67)		25 (50)		–	–	sharpleaf valerian
VIAM	Vicia americana	6 (67)		8 (50)		2 (75)		American vetch
GROUND COVER								
.BARESO	bare soil	4 (83)		10 (50)		8 (100)		
.LITTER	litter and duff	91 (100)		89 (50)		90 (100)		
.GRAVEL	gravel 0.2-10 cm	2		T		1		
.COBBLE	cobble 10-25 cm	–	–	–	–	–	–	
.STONES	stone > 25 cm	2 (17)		–	–	–	–	
.MOSSON	moss on soil	4 (17)		–	–	1 (50)		
.LICHENS	lichens on soil	–		–		T		